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APPLICATION

FOR

UNITED STATES LETTERS PATENT

SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

Be it known that **James M. Leventhal** has an invention entitled **FLUID DISPENSING DEVICE** of which the following description in connection with the accompanying figures is a specification.

FLUID DISPENSING DEVICE

CLAIM OF PRIORITY TO PRIOR APPLICATIONS

This application claims priority under 35 U.S.C. § 119(e) to United States provisional application Serial No. 60/405,009, filed on August 21, 2002, which is incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates generally to devices for dispensing a fluid spray or mist. More particularly, the invention provides a portable, cordless fluid spraying or misting device configured as a brush.

BACKGROUND OF THE INVENTION

Hairbrushes generally and round hairbrushes specifically are used to style, smooth and detangle hair. A conventional hairbrush typically includes a handle at its proximal end and at its distal end a portion to hold a plurality of bristles. The proximal end of the brush is often a shaped handle and is constructed of any one or a combination of materials. The distal end is often shaped, for instance, as a round or paddle-like conformation, and is similarly constructed of any one or a combination of materials. Bristles can be constructed of synthetic materials, as well as natural materials and fibers. The length and the distribution of bristles of a brush can vary widely, depending on the type of hairbrush design, the aesthetic appeal sought, or the styling effect desired.

Hairbrushes are generally used in a hair styling process and are often used in conjunction with water or other hair products to achieve a desired styling effect. Dry hair is often difficult to style with a hairbrush and can be more easily styled when it is wet. Therefore, adding water to a hair styling process can ease styling and can be beneficial in terms of achieving a desired effect, reducing the amount of time required and the materials necessary to style hair.

For these reasons, many people prefer to style their hair when it is wet, styling hair after bathing and/or adding water to their hair during a styling process. Adding water to hair can include, for instance, manually applying water to hair or spraying water from a portable, pump-action spray bottle. Applying water manually or from a spray bottle during a styling process, while brushing and styling hair with a brush and/or a blow dryer, often requires substantial manual finesse. Typically, moistening hair and styling hair with a brush are steps performed separately and repeated many times until hair is adequately moistened and styled in a desired fashion. For many people, this process is difficult.

Traveling with hairbrushes and a portable spray bottle can be cumbersome. In addition, use of hairbrushes and a portable spray bottle to style hair away from home or in a public restroom can be inconvenient. In particular, in the work place, people are likely to prefer a discreet means of brushing and styling their hair when necessary.

Thus, a means of conveniently, discreetly, and quickly moistening hair while styling hair without drawing attention to one is desirable.

Prior art hairbrush designs provide methods for moistening and brushing hair including a liquid dispensing hairbrush disclosed in U.S. Patent 5,927,290. The liquid dispensing hairbrush includes a spray mechanism that allows a user to spray a liquid from

a bristle area of the hairbrush. This device requires a user to coordinate multiple manual pumping actions of the spray mechanism with multiple manual hairstyling, e.g., brushing, actions, while requiring the user to aim the spray mechanism at a desired area of hair.

U.S. Patent 5,909,737 discloses a combination brush and hairspray system for allowing a user to simultaneously brush and apply hairspray to their hair using only one hand. The combination includes a fluid chamber connected to a plurality of delivery tubes operatively connected to a pump.

The devices disclosed in U.S. Patents 5,927,290 and 5,909,737 include a short trigger mechanism that permits the device to deliver a small volume, and often a heavy flow or ration, of fluid from a reservoir. In many instances, the device potentially delivers either too little fluid or water and the effect is counter-productive, or too much fluid or water at one location that produces messy results. In addition, the short trigger mechanism requires a user to pump the trigger many times or repeatedly during a styling process, which action, as noted, can be ineffective and ultimately can be tiresome.

A device disclosed in U.S. Patent 5,746,531 is configured to store and to dispense fluid from a proximal end of a hairbrush handle, rather than from a portion of the brush containing bristles. A user of this device is not able to simultaneously spray their hair with a fluid or water while brushing their hair.

U.S. Patents 6,158,442 and 6,276,367 disclose hairbrush devices that store fluid in a head of a hairbrush and dispense the fluid from tips of each or several of a plurality of bristles that is connected at a distal end of the hairbrush. As fluid is generally dispensed from the tips of bristles, such a hairbrush design effectively delivers fluid or water to a user's scalp rather than through the user's hair.

While the prior art devices discussed above may provide a user with some functionality with respect to styling hair, such devices do not permit a user to automatically and/or continuously apply a fluid or water spray or mist to their hair, while simultaneously brushing their hair. Thus, it is desirable to have a fluid dispensing device configured as a brush to permit a user to apply a fluid spray or mist to his/her hair during brushing. In addition, it is desirable that such a fluid dispensing device provides a substantially moderate and relatively even distribution of fluid or water throughout hair while it is being brushed.

SUMMARY OF THE INVENTION

In an aspect of the invention, a fluid dispensing brush comprises a body defining a first chamber and a second chamber, the body having a plurality of openings defined in at least a portion of its outer surface in fluid communication with the first chamber and a plurality of bristles projecting therefrom. The dispensing brush further comprises a fluid assembly contained in the second chamber, the fluid assembly having an enclosed pressurized reservoir configured to maintain a quantity of fluid under pressure and further having an actuator disposed and configured to discharge a volume of pressure from the pressurized reservoir when actuated such that a volume of fluid is discharged from the pressurized reservoir. The brush also comprises a nozzle contained in the first chamber, the nozzle having one or more holes defined in at least a portion of its outer surface in fluid communication with the first chamber, the nozzle being configured and connected to the pressurized reservoir such that the nozzle receives at least a portion of the volume of fluid discharged from the pressurized reservoir and the one or more holes discharge the volume

of fluid into the first chamber as one of a fluid spray and a fluid mist, wherein the plurality of openings vents the fluid from the brush.

Implementations of the invention may include one or more of the following features. The body of the brush includes a barrel portion defining the first chamber and a handle portion defining the second chamber. The actuator includes a valve operatively connected to a first end of the pressurized reservoir and configured to discharge pressure from the pressurized reservoir when actuated. The brush further includes a switch disposed in the outer surface; the switch being further disposed and configured to couple with the valve such that movement of the switch from a first position to a second position actuates the valve. The switch is disposed in the outer surface along the handle portion. Movement of the switch from the first position to the second position includes depressing the switch. The pressurized reservoir further includes a pressurized gas cartridge configured to contain a compressed gas and operatively connected to the pressurized reservoir such that an interior of the gas cartridge is in fluid communication with an interior of the pressurized reservoir. The pressurized gas cartridge is disposed and configured to release a volume of compressed gas into the interior of the pressurized reservoir. The compressed gas can include compressed air, compressed N_2O or compressed CO_2.

Implementations of the invention may further include one or more of the following features. Each hole of the nozzle is sized and configured, and wherein the actuator is further configured to discharge the volume of pressure with sufficient force, such that the nozzle discharges the fluid volume of fluid as one of fine fluid droplets and ultra-fine fluid droplets. Each hole has a span ranging from about 0.4 mm to about 1.0 mm. Each hole of

the nozzle is sized and configured, and wherein the actuator is further configured to discharge the volume of pressure with sufficient force, such that the nozzle discharges the volume of fluid as one of an atomized spray and an atomized fluid mist. The nozzle can further include a hollow elongated tube configured to extend from the first chamber into the second chamber, and further configured to place an interior of the nozzle in fluid communication with the interior of the pressurized reservoir.

Other embodiments of the invention may include the barrel portion and the handle portion configured such that the barrel portion is removably connected to the handle portion. The barrel portion can define a circular cylinder, and the handle portion can define a circular cylinder. The plurality of bristles can be distributed along the outer surface of the cylinder such that the plurality of bristles defines a round brush. The plurality of openings can be distributed along the outer surface of the cylinder such that the fluid vents from a circumferential perimeter of the circular cylinder. In another embodiment, the barrel portion can define a paddle-shaped conformation having a first side and a second side, wherein the plurality of bristles and the plurality of openings are disposed along at least a portion of the first side.

In another aspect of the invention, a fluid dispensing brush comprises a body defining a chamber, the body having a plurality of openings defined in at least a portion of its outer surface in fluid communication with the chamber and a plurality of bristles projecting therefrom; a fluid assembly contained in a first portion of the chamber, the fluid assembly having an enclosed pressurized reservoir configured to maintain a quantity of fluid under pressure and further having an actuator disposed and configured to discharge a volume of pressure from the pressurized reservoir when actuated such that a volume of

fluid is discharged from the pressurized reservoir; and a nozzle contained in a second portion of the chamber, the nozzle having one or more holes defined in at least a portion of its outer surface in fluid communication with the chamber, the nozzle being configured and connected to the pressurized reservoir such that the nozzle receives at least a portion of the volume of fluid discharged from the pressurized reservoir and the one or more holes discharges the volume of fluid into the chamber as one of a fluid spray and a fluid mist, wherein the plurality of openings vents the fluid from the brush.

In still another aspect of the invention, a fluid dispensing brush comprises a body defining a chamber; at least a portion of an outer surface of the body defining a plurality of openings in fluid communication with the chamber and having a plurality of bristles projecting therefrom; means contained by the body within the chamber to contain and to maintain a quantity of fluid under pressure; means contained by the body within the chamber to discharge a volume of pressurized fluid; and means contained by the body within the chamber to receive the volume of fluid discharged and to vent the volume of fluid through the plurality of openings.

Implementations of the invention may further include one or more of the following features. Means to contain and to maintain the quantity of fluid under pressure includes an enclosed reservoir configured to contain the quantity of fluid and a compressed gas cartridge operatively connected to the enclosed reservoir such that an interior of the compressed gas cartridge is in fluid communication with an interior of the enclosed reservoir. The compressed gas cartridge can be configured to contain a quantity of compressed gas and further configured to release a volume of the compressed gas into the interior of the enclosed reservoir to maintain the quantity of fluid contained therein under

pressure. Means to discharge the volume of pressurized fluid includes a valve disposed and configured such that when the valve is actuated the volume of pressurized fluid is released. The valve can be further disposed and further configured to mate with a switch disposed along the outer surface such that movement of the switch from a first position to a second position actuates the valve. Means to receive the volume of fluid discharged and to vent the volume of fluid through the plurality of openings includes a nozzle disposed in the chamber having one or more holes defined in its outer surface in fluid communication with the plurality of openings. Each hole can be disposed and configured to discharge the volume of fluid as one of a fluid spray and a fluid mist.

Various aspects of the invention may provide one or more of the following advantages. Improved styling capability of a traditional hairbrush can be provided and can be incorporated with a variety of hairbrush styles and designs. Fluids and/or fluid sprays or mists can be dispensed from a brush and applied throughout a user's hair in a continuous and/or intermittent manner during a hair drying, styling and/or brushing process, and can be directed to areas of a user's hair that require fluid. Fluids and/or fluid sprays or mists can be applied to a user's hair as a spray or mist of fine or ultra-fine fluid droplets, or as an atomized fluid spray or mist. Application of a fluid to a user's hair as a fluid spray or mist helps to minimize/reduce an application of fluid as a heavy fluid stream. Fluids and/or fluid sprays or mists can be dispensed from a brush and applied to a user's hair when the user styles his/her hair with the brush to achieve a substantially moderate and relatively even distribution of fluid throughout the user's hair. A fluid can be dispensed from a brush and applied to a surface or substrate, e.g., hair, in a desired spray or mist pattern, e.g., projecting from the brush as a substantially radially projecting 360°

pattern or a substantially outward projecting pattern, to vary the extent of coverage of the fluid spray or mist on the surface or substrate. Application of fluids and/or fluid sprays or mists can be portable and repeatable, and can be done in locations without access to electricity. Easy assembly and disassembly of a fluid dispensing brush can be provided to refill or replace one or more components of the brush required to discharge and/or to apply an application of fluid or fluid spray or mist.

These and other advantages of the invention, along with the invention itself, will be more fully understood after a review of the following figures, and detailed description.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a perspective view of one embodiment of a fluid dispensing device according to the invention;

FIG. 2 is an exploded perspective view of the device shown in **FIG. 1** illustrating a barrel including a plurality of bristles disengaged from a handle;

FIG. 2A is a partial perspective view of the device shown in **FIGS. 1-2** illustrating the barrel disengaged from the handle;

FIG. 3 is a perspective view of the handle shown in **FIGS. 1-2** including a fluid misting assembly disposed therein;

FIG. 4 is an exploded perspective view of the fluid misting assembly shown in **FIG. 3**;

FIG. 5 is a perspective view of one embodiment of a nozzle, a dip tube and a screw collar of the fluid misting assembly shown in **FIGS. 3-4**;

FIGS. 5A-5B are perspective views of another embodiment of the nozzle of the fluid misting assembly shown in **FIGS. 3-4** including a dispensing valve;

FIG. 6 is a perspective view of a fluid reservoir and a pressurized gas cartridge of the fluid misting assembly shown in **FIGS. 3-4**;

FIG. 7 is a perspective view of another embodiment of the fluid dispensing device according to the invention; and

FIG. 8 is an exploded perspective view of the device shown in **FIG. 7** illustrating the barrel including the plurality of bristles disengaged from the handle.

DETAILED DESCRIPTION OF THE INVENTION

For purposes of illustration, embodiments of the invention will be described with reference to a hairbrush constructed and arranged to dispense a fluid spray or mist for use in brushing, drying and styling hair, as shown in **FIGS. 1-8**. Those skilled in the art will appreciate that embodiments of the invention are not limited to a hairbrush, but also may include a variety of brushes or devices for dispensing fluid designed for use in other applications.

Referring to **FIGS. 1-2,** one embodiment of the invention provides a portable, cordless fluid dispensing device **100** configured as a hairbrush. The device **100** includes a hollow barrel **104** removably connected to a hollow handle **102**. The barrel **104** defines an interior chamber **104B** and includes at least a portion of an outer surface **104A** having a plurality of openings **112** and a plurality of bristles **106** disposed therein. The handle **102** is disposed at a proximal end of the barrel **104** and defines an interior chamber **102A** configured to contain a fluid misting assembly **101**, as shown in **FIG. 4**. The assembly

101 is configured to dispense a fluid spray or mist from the barrel **104** when the device **100** is actuated. The device **100** can be configured to help to deliver a substantially moderate and relatively even distribution of fluid spray or mist throughout a user's hair during use of the device **100**. The fluid misting assembly **101** can include a nozzle **116**, a dip tube **118**, a screw collar **120**, an actuator switch **134**, an actuator valve **122**, an enclosed, refillable fluid reservoir **110**, and a pressurized gas cartridge **136** (not shown). The cartridge **136** is in fluid communication with an interior chamber defined by the reservoir **110** to pressurize the interior of the reservoir **110** and its fluid contents. Upon actuation of the device **100**, a fluid spray or mist is discharged from the reservoir **110** and dispensed from the plurality of openings **112** of the barrel **102**. The device **110** thereby delivers a fluid spray or mist to a user's hair during brushing and styling of the user's hair with the device **110**. Other embodiments are within the scope of the invention.

The barrel **104** and the handle **102** are each constructed and arranged such that the components can be readily engaged to form the device **100** and disengaged to separate the barrel **104** from the handle **102**. The barrel **104** and the handle **102** can be disengaged to provide access to elements of the fluid misting assembly **101** for various purposes including, for instances, refilling or replacing the reservoir **110** or checking the level of fluid contained within the reservoir **110**.

In one embodiment of the invention, a proximal end **113** of the barrel **104** and a distal end **115** of the handle **102** are constructed and arranged to removably couple and to securely connect the barrel **104** to the handle **102**. The proximal end **113** of the barrel **104** defines an opening **114** configured and sized to receive at least a portion of the distal end **115** of the handle **102**. The portion of the distal end **115** of the handle **102** can be

configured such that when it is inserted into the opening **114**, the portion of the distal end **115** mates with an inner surface immediately adjacent to the opening **114** to removably couple the barrel **104** to the handle **102**.

As shown in **FIG. 2**, in one embodiment, the portion of the distal end **115** and the inner surface adjacent to the opening **114** can be further configured to define a groove/notch-type combination that will permit the barrel **104** and the handle **102** to be removably and securely connected. For instance, the distal end **115** of the handle **102** can include one or more tabs, ribs or other protrusions **109** configured for mating with corresponding slots or grooves **111** defined in the inner surface adjacent to the opening **114**. The slots or grooves **111** can be configured to receive the one or more tabs or ribs where the distal end **115** of the handle **102** and the proximal end **113** of the barrel **104** are coupled, and can be sized to insure that when coupled the tabs or ribs **109** mate with the surfaces of the slots or grooves **111** to achieve a close fit.

Where the distal end 115 of the handle **102** is inserted into the opening **114**, the distal end **115** can be rotated, e.g., clockwise, until each of the one or more slots or grooves receives and mates with one of the tabs or ribs, thereby engaging the groove/notch combination and securely connecting the handle **102** to the barrel **104**. Rotating the handle **102** in an opposite direction, e.g., counterclockwise, can disengage the groove/notch combination to separate the handle **102** from the barrel **104**.

Referring to **FIG. 2A**, in another embodiment of the invention, the barrel **104** and the handle **102** are removably connected by a combination of one or more protruding tabs or notches **117** and one or more grooves **119**. In one embodiment, the one or more protruding tabs or notches **117** are disposed along the inner surface adjacent to the opening

114 defined at the proximal end of the barrel **104**. Each protruding tab or notch **117** is sized and configured such that a groove **119** defined in the portion of the distal end **115** of the handle **102** receives the tab or notch **117** when the portion of the distal end **115** is inserted into the opening **114**. As shown in **FIG. 2A**, the portion of the distal end of the handle **102** can include one or more grooves **119** to receive one or more tabs or notches **117** of the barrel **104**. In one embodiment, each groove **119** defines an L-shape such that an L-shaped groove path **121** is provided. When each tab or notch **117** is inserted into a corresponding groove **119**, the L-shaped groove **119** is sized and configured to receive the tab or notch **117** and to guide the tab or notch **117** along the groove path **121**, requiring the barrel **102** or the handle **104** to be rotated, e.g., clockwise, to permit the tab or notch **117** to be fully inserted and to mate with an end of the groove path **121**. In one embodiment, each guide path **121** further includes a groove bump **123**. The groove bump **123** provides a resistance to insertion of the tab or notch **117** along the groove path **121** and requires a user apply some manual force or pressure to overcome the groove bump **123** to fully insert and to mate the tab or notch **117** with the end of the groove path **121**. In one embodiment, the groove bump **123** is configured to help to maintain the tab or notch **117** in its position to thereby help to securely connect the barrel **104** to the handle **102**. The groove **119** configuration requires a user to rotate, e.g., counterclockwise, the barrel **104** or the handle **102** to disconnect the barrel **104** from the handle **102**. Coupling of the tabs or notches **117** and the grooves **119** thereby permits the barrel **104** and the handle **102** to be removably and securely connected.

The barrel **104** is designed and configured to define any desired or required conformation. As shown in **FIG. 1**, in one embodiment of the invention, the barrel **104**

defines a substantially circular cylinder, usually referred to as a "round hairbrush", with the plurality of bristles **106** and the plurality of openings **112** distributed around the outer surface **104A** of the barrel **104**. As described below with respect to other embodiments, the invention is not limited with respect to the conformation of the barrel **104** and anticipates that the barrel **104** can define a variety of shapes and configurations. The barrel **104** conformation may be limited only by the size and the configuration of its interior chamber **104B** required to accommodate dispensing elements of the fluid misting assembly **101**.

The interior chamber **104B** of the barrel **104** is sized and configured to receive at least a portion of one or more of the dispensing elements of the fluid misting assembly **101**. In one embodiment, the chamber **104B** is sized and configured to receive and contain the nozzle **116** and a portion of the dip tube **118**. When the device **100** is actuated, a fluid is discharged from the reservoir **110** and is dispensed into the dip tube **118** and ultimately from the nozzle **116** and the openings **112** of the barrel **104**. The chamber **104B** is sized and configured to permit a fluid discharged from the nozzle **116** to permeate through the openings **112**.

The openings **112** of the barrel **104** define a vented surface along at least a portion of the outer surface **104A**. Each opening **112** is in fluid communication with the interior chamber **104B** and an area external to the barrel **104** to permit gas, e.g., air, and/or a fluid, e.g., water, to permeate or dispense from the chamber **104B**. When the device **100** is actuated, the actuator valve **122** causes a volume of pressure to discharge from the reservoir **110**, which causes a volume of fluid to discharge from the reservoir **110** into the dip tube **118** and the nozzle **116**. The nozzle **116** discharges the volume of fluid as a fluid

spray or mist into the chamber of the barrel **104** and from the openings **112** of the barrel **104**. In one embodiment, the openings **112** can define a repeating pattern or a random array along at least a portion of the outer surface **104A**.

As shown in **FIG. 1**, and as described above, in one embodiment, the barrel **104** can define a round hairbrush and can include the openings **112** distributed substantially around its outer surface **104A**. In this case, the openings **112** dispense a fluid spray or mist from the barrel **104** in different directions along its circumferential perimeter such that a fluid pattern radiates from the barrel **104** that substantially approaches a circular or 360° spraying or misting pattern. The distribution of the openings **112** thereby, in part, helps to dispense a substantially moderate and relatively even distribution of a fluid spray or mist throughout a user's hair when the user brushes his/her hair with the device **100**.

Similarly, in one embodiment, the plurality of bristles **106B** can define a repeating pattern or a random array along at least a portion of the outer surface **104A**. A distribution or pattern of the bristles **106** can depend, in part, on an application in which the device **100** is to be used or a desired or required aesthetic appeal or design of the device **100**.

Like the barrel **104**, the handle **102** is designed and configured to define any desired or required conformation. As shown in **FIG. 1**, in one embodiment, the handle **102** defines a substantially circular cylinder. The invention is not limited with respect to the conformation of the handle **102** and anticipates that the handle **104** can define a variety of shapes and configurations, and may further include a texturized outer surface or other surface conformations to help to provide a comfortable and secure manual grip of the device **100**. The handle **102** conformation may be limited only by the size and the configuration of its interior chamber **104B** that are required to accommodate the fluid

As shown in **FIG. 3**, when coupled, the reservoir **110** and the cartridge **136** are configured and sized such that at least a portion of the chamber **102A** of the handle **102** receives and contains these components. An inner surface of the handle **102** defining the chamber **102A** includes one or more ribs **126** configured to help to guide the insertion of the reservoir **110** and the cartridge **136** into the chamber **102A**, and to help to securely dispose the reservoir **110** and the cartridge **136** within the handle **102**. In one embodiment, the one or more ribs **126** are continuous and extend laterally around a perimeter of the inner surface of the handle **102** such that the ribs **126** define a circular, an elliptical, or a concave-shaped cross section. As shown in FIG. **3**, in one embodiment, the handle **102** includes three ribs **126** defined by the inner surface of the chamber **102A** to help to securely dispose the cartridge **136** within the chamber **102A**, which, in effect, helps to securely dispose the reservoir **110** within the chamber **102A**.

As shown in **FIG. 4**, in one embodiment, the inner surface of the chamber **102A** can further include one or more protruding tabs **126A** disposed and configured to couple with the proximal end of the reservoir **110**. The tabs **126A** are defined in the inner surface such that when the reservoir **110** is disposed within the chamber **102A**, the proximal end of the reservoir **110** mates with at least a portion of each of the protruding tabs **126A** and is thereby positioned within the chamber **102A** to receive the cartridge **136**.

As shown in **FIG. 4**, in one embodiment, the inner surface of the chamber **102A** defines an additional rib **128** at the distal end **115** of the handle **102** to help to position and to securely maintain the reservoir **110** in its position within the chamber **102A.** The ribs **126**, **128**, in particular, help to securely maintain the reservoir **110** and the cartridge **136** in position within the chamber **102A**, for instance, during pressurization of the reservoir **110**

interior by the cartridge **136**, and during refill of the reservoir **110** at the distal end **115** of the handle **102**.

With further reference to **FIG. 3**, in one embodiment of the invention, the reservoir **110** is joined to a portion of the inner surface of the chamber **102A** of the handle **102** and/or to one or more of the ribs **126, 128** such that the reservoir **110** is not removable from the handle **102**.

Referring to **FIG. 5**, and with further reference to **FIGS. 3-4**, the nozzle **116** is disposed at the distal end of the dip tube **118**. When the device **100** is assembled, the dip tube **118** extends into the interior chamber **104B** of the barrel **102** such that at least a portion of the dip tube **118** and the nozzle **116** are disposed therein. The nozzle **116** is further disposed and configured to emit or discharge fluid as a fluid spray or mist, e.g., a spray or mist consisting of fine or ultra-fine droplets or an atomized fluid spray or mist. The nozzle **116** discharges the fluid spray or mist into the chamber **102A** and through the plurality of openings **122** of the barrel **104,** and ultimately to a user's hair.

In one embodiment, the nozzle **116** is configured to emit or discharge a fluid spray or mist, e.g., in a substantially circular-like pattern or in a pattern that radiates from the nozzle **116** at about 360° along its perimeter. In one embodiment, the nozzle **116** is configured as a substantially circular-shaped, disk-like element **116** that defines a plurality of holes **190** in an outer perimeter or a circumferential edge of the nozzle **116**. The distribution of the holes **190** helps to discharge a fluid spray or mist as a pattern substantially radiating at about 360° from the nozzle **116**. Embodiments of the invention in which the barrel **104** is a round cylinder and the openings **112** are defined and distributed around the barrel **104**, the openings **112** would dispense a fluid spray or mist in

substantially a number of directions or angles from the round-shaped barrel **104** in a pattern substantially radiating at about 360°. In one embodiment, the circular-shaped nozzle **116** further defines one or more additional holes **190A** in a first outer surface of the nozzle **116** opposite to a second outer surface that couples to the dip tube **118**.

Each hole **190, 190A** is sized and configured to affect a volume of fluid the nozzle **116** discharges. In one embodiment, the holes **190, 190A** are sized and configured to help to prevent/minimize discharge of a fluid from the nozzle **116** as a heavy stream or pattern of fluid. In one embodiment, the holes **190, 190A** have very small spans or narrow diameters to help to increase/maximize the extent fluid is discharged as a spray or mist and/or to help to increase/maximize the extent fluid is atomization when forced through and discharged from each hole **190, 190A**. In one embodiment, each hole **190, 190A** can define a span or diameter of from about 0.4 mm to about 1.0 mm. In addition, the number and/or the distribution of the holes **190, 190A** can help to increase/maximize the extent of fluid atomization.

Referring to **FIGS. 5A-5B**, in another embodiment of the invention, the nozzle **116** is configured and arranged such that turning the nozzle **116** in a bi-directional orientation, as shown by arrow **150** in **FIG. 5B**, helps to adjust, e.g., increase or decrease, a size of an opening **140** defined in the nozzle **116**. Adjusting the size of the opening **140** thereby helps to adjust a volume of fluid discharged and/or helps to discharge fluid as a spray, a mist or an atomized spray or mist. In this case, the nozzle **116** provides a dispensing valve **142** coupled with the opening **140**. The dispensing valve **142** and the opening **140** are disposed in fluid communication with the dip tube **118** and are configured to dispense fluid from the nozzle **116**. As shown in **FIG. 5A**, in one embodiment, the dispensing valve **142**

and the opening **140** are disposed in the first outer surface of the nozzle **116** opposite to its second surface coupled with the dip tube **118**. As shown in **FIG. 5B**, in one embodiment, the dispensing valve **142** and the opening **140** are disposed in fluid communication with the dip tube **118** via a dip tube extension **118A**, e.g., an elongate or tapered portion of the distal end of the dip tube **118** configured such that the dispensing valve **142** couples or receives the extension **118A**.

When the nozzle **116** is turned in a bi-directional orientation, as shown by arrow **150** in **FIG. 5B**, the dispensing valve **142** actuates to adjust, e.g., increase or decrease, a size of the opening **140** and thereby to adjust a volume and/or nature of fluid discharged from the nozzle **116**. In one embodiment, the dispensing valve **142** is configured and arranged to dispense fluid as a spray, a mist or an atomized spray or mist. In one embodiment, the dispensing valve **142** is configured and arranged to define the opening **140** with a span or diameter ranging from about 0.4 mm to about 1.0 mm. In another embodiment, the dispensing valve **142** is further configured and arranged to permit the nozzle **116** to be turned such that the dispensing valve **142** closes the opening **140** substantially completely to prevent fluid discharge. The invention anticipates that the dispensing valve **142** may be any type of valve know in the art suitable for use with the nozzle **116** and for increasing and decreasing a span or diameter of the opening **140** to affect a volume and extent of atomization of a fluid discharged from the nozzle **116**, and/or to substantially completely open and close the opening **140** of the nozzle **116**.

As shown in **FIG. 5B**, in one embodiment, the nozzle **116** further includes a plurality of ridges **144** defined along at least a portion of its outer perimeter surface to

provide a user grip to help a user to turn the nozzle **116** to adjust a volume and nature of fluid discharged from the nozzle **116**.

Referring further to **FIGS. 3-5**, the dip tube **118** is an elongated, hollow member coupled to a distal end of the reservoir **110**. A portion of the dip tube **118** inserts through an opening of the actuator valve **122** disposed at the distal end of the reservoir **110** in fluid communication with the interior of the reservoir **110**. The dip tube **118** extends into the interior of the reservoir **110** at a length sufficient such that the dip tube **118** is in communication with the fluid contents of the reservoir **110** and positioned at a depth sufficient to receive a volume of fluid discharged from the pressurized reservoir **110** interior when the device **100** is actuated.

The dip tube **118** is removably coupled and securely connected to the reservoir **110** by a screw collar **120**. The collar **120** is disposed at a position along the dip tube **118** such that when the collar **120** is coupled with the distal end of the reservoir **110** and the dip tube **118** is inserted into the reservoir **110** interior, an optimal length of the dip tube **118** extends into the reservoir **110**, as described above.

The collar **120** couples with the distal end of the reservoir **110** by sets of corresponding threads disposed along the collar **120** and at the distal end of the reservoir **110**. As shown in **FIG. 5**, a first set of threads **180** is defined along an inner surface of the collar **120** at its proximal end that are configured and sized to couple with and connect to a second set of threads **184** defined at the distal end of the reservoir **110**. The collar **120** is positioned over the distal end of the reservoir **110** and the first and the second set of threads **180**, **184** mate when the collar **120** is rotated along the second set of threads **184**, thereby removably and securely connecting the dip tube **118** to the reservoir **110**. The

collar **122** and its position along the dip tube **118** help to insure that the length of the portion of the dip tube **118** extending into the reservoir **110** is sufficient for the dip tube **118** to contact the fluid contents of the reservoir **110** and to receive a volume of fluid discharged from the reservoir **110**.

In one embodiment, the dip tube **118** and the collar **122** are constructed as a single unit. The dip tube **118** and the collar **122**, in this case, are constructed of a material suitable for use in moist and wet conditions and to withstand a degree of wear and tear as a consequence of, for instance, engaging and disengaging the fluid misting assembly **101** from the handle **102**. A suitable material includes, but is not limited to, plastic, whereby a plastic molding or injection-molding method or process well known in the art can be used to form the dip tube **118** and the collar **122**. As a single unit, the depth of the dip tube **118** extending into the interior of the reservoir **110** is substantially insured.

A ring **186** is disposed along the dip tube **118** below the collar **120**. When the dip tube **118** is connected to the reservoir **110**, the ring **186** helps to permit the dip tube **118** to extend into the reservoir **110** at a depth sufficient to help the dip tube **118** receive a volume of fluid discharged from the pressurized interior of the reservoir **110** upon actuation of the device **100**, as noted above. The ring **186** is sized and configured such that it mates along the distal end of the reservoir **110**.

In addition, the collar **120** can further include a washer or an O-ring (not shown) disposed along an inner surface of the collar **120** at its distal end to help to provide a seal that helps to minimize/reduce a loss of pressure and/or gas from the reservoir **110** during the pressurization of the reservoir **110** interior. Alternatively, the ring **186** can be

constructed of a material suitable for providing sealing properties similar to a washer or an O-ring.

The collar **120** can further include one or more ribs **182** defined in its outer surface and extending vertically along the outer surface to help to serve as a manual grip for a user. The ribs **182** can further help a user engage and disengage the dip tube **118** from the reservoir **110**, for instances, to refill or to replace the reservoir **110**.

With further reference to **FIGS. 3-4**, the switch **134** is disposed along and mounted in an outer surface of the handle **104**. In one embodiment, the switch **134** is disposed posterior to the actuator valve **122**. The switch **134** is disposed and configured to select and to actuate one or more operation settings or functions of the device **100**. In one embodiment, the switch **134** is further disposed in the outer surface of the handle **104** such that the switch **134** is positioned over or in alignment with at least a portion of an actuator conduit **148** disposed within the interior of the handle **102**. As shown in **FIG. 3**, the actuator conduit **148** is configured to contact or to couple with the actuator valve **122** and to extend from the distal end of the reservoir **110** into the chamber **102A** of the handle **102**, e.g., to be disposed along an outer surface of the reservoir **110**.

In one embodiment, when the switch **134** is actuated, the switch **134** contacts the actuator conduit **148**, which in turn contacts and actuates the actuator valve **122**. When engaged, the actuator valve **122** causes a discharge of fluid from the pressurized reservoir **110**, and when disengaged the valve **122** does not cause a fluid discharge. In one embodiment, the switch **134** is configured such that manually actuating, e.g., depressing or shifting, the switch **134** causes the switch **134** to contact the actuator conduit **148** and to depress or shift the actuator conduit **148** into an actuated position. When the actuator

conduit **148** is depressed or shifted into an actuated position, the movement of the actuator conduit **148** to such a position causes the actuator valve **122** to become actuated, e.g., depressed or shifted. The actuation, or the depressing or shifting movement, of the actuator valve **122** causes a release or discharge of a volume of pressure from the pressurized interior of the reservoir **110** and a resultant simultaneous discharge of a volume of its fluid contents into the dip tube **118** and from the nozzle **116**. Fluid is dispensed from the reservoir **110** with a dispensing force sufficient to help to dispense the fluid through the nozzle **116** and the openings **112** as a fluid spray or mist, e.g., of fine or ultra fine droplets or as an atomized fluid spray or mist. The dispensing force is a consequence of the pressurized state of the interior of the reservoir **100** just before the actuator valve **122** actuates release pressure and fluid from the reservoir **110**.

The switch **134** is disposed and configured such that manually actuating, e.g., depressing or shifting, the switch **134** a certain number of times and/or in a certain direction causes the device **100** to be in one or more operation settings or functions, such as, for instance, an "ON" setting, an "OFF" setting and/or a "MIST" setting.

In one embodiment, the switch **134** is disposed and configured such that when a user manually depresses the switch **134** continuously the device **100** dispenses a continuous fluid spray or mist from the barrel **104**. In one embodiment, the switch **134** is disposed and configured such that when the switch **134** is depressed manually, the switch **134** remains depressed, which essentially places the device **100** in a "MIST" setting whereby the device **100** dispenses a fluid spray or mist continuously, until such time as the switch **134** is depressed a second time to release the switch **134** and to place the device **100** in an "OFF" setting to discontinue dispensing. In another embodiment, the switch **134** is

disposed and configured such that depressing the switch **134** intermittently causes the device **100** to intermittently discharge a fluid spray or mist. The invention anticipates that the switch **134** can be disposed and configured such that shifting the switch **134**, rather than depressing the switch **134**, from a first to a second position and/or from a second to a first position can place the device **100** in similar operation settings to actuate misting functions as described above.

In another embodiment of the invention, the switch **134** is disposed and configured such that when the switch **134** is shifted from a first "OFF" position to a second "ON" position, the switch **134** is positioned such that when the switch **134** is manually depressed, the switch **134** places the device **100** in a "MIST" setting and causes the device **100** to dispense continuously and/or intermittently a fluid spray or mist.

The invention is not limited to the configuration of the switch **134** nor to the arrangement of the switch **134** and the actuating conduit **148** as described above for actuating one or more settings or functions of the device **100,** and anticipates that the switch **134**, the actuating conduit **148** and/or other actuating mechanisms can be incorporated into the device **100** and/or the assembly **101** to provide the necessary or desired fluid dispensing operation settings to meet a required or preferred mode of dispensing a fluid spray or mist from the device **100**.

As noted above, and with further reference to **FIGS. 3-4**, the reservoir **110** is disposed in the chamber **102A** of the handle **102** anterior to the gas cartridge **136** and is connected to the dip tube **118** via the collar **120**. The collar **120** helps to position and to stabilize the reservoir **110** within the chamber **102A** during pressurization of the reservoir

110. The reservoir **110** defines an interior sized and configured to contain a required or desired volume of fluid.

The reservoir **110** is disposed and configured such that to inspect or to refill the reservoir **110**, the barrel **102** need only be disengaged from the handle **102** and the collar **120** and the dip tube **118** disconnected and removed from the distal end of the reservoir **110**. In one embodiment, at least a portion of a side wall of the reservoir **110** is constructed of a clear material suitable for providing a visual inspection of the reservoir **110** interior. In one embodiment, the portion of the side wall of the reservoir **110** is constructed of a clear material including, but not limited to, a translucent/transparent polycarbonate or plastic to permit visual inspection of the reservoir **110** interior and, in particular, to permit visual inspection of a level of the fluid contents contained within the reservoir **110**. In one embodiment, the reservoir **110** can be entirely constructed of a translucent/transparent polycarbonate or plastic.

As shown in **FIG. 1**, in one embodiment, a portion of a side wall of the handle **102** is configured as a window-like structure **102B** and is constructed of a clear material, such as those materials noted above. The clear window-like structure **102B** is disposed and configured in the side wall of the handle **102** such that the structure **102B** is positioned adjacent to and substantially aligned with the clear portion of the reservoir **110** to permit visual inspection of the reservoir **110** interior and the level of its fluid contents without disengaging the barrel **104** from the handle **102** and disconnecting the collar **120** and the dip tube **118** from the reservoir **110**. During use, the "clear" portion of the reservoir **110** and window-like structure **102B** permit a user to visually and conveniently inspect a fluid level of the reservoir **110** without disassembling the device **100**.

Still referring to **FIGS. 3-4**, the pressurized gas cartridge **136** is disposed within the chamber **102A** of the handle **102** posterior to the reservoir **110**. The cartridge **136** is configured to contain a volume of compressed gas and is further configured to discharge a volume of compressed gas when its interior is accessed. The cartridge **136** can include, but is not limited to, a compressed air, N_2O or CO_2-filled cartridge. The cartridge **136** is portable and can range in volume of from about 5 grams to about 25 grams. The size (volume) of the cartridge **136** is only limited to accommodate a size of the chamber **102A** and the handle **102,** and a practical size of the hairbrush device **100**.

Referring to **FIG. 6**, and with further reference to **FIG. 4**, the handle **102** and its interior components are assembled in part by insertion of the cartridge **136** into the chamber **102A** of the handle **102**. The cartridge **136** includes a size and shape for insertion of the cartridge **136** into the proximal end of the handle **102**. When the cartridge **136** is inserted into the chamber **102A**, the cartridge **136** is coupled to the proximal end of the reservoir **110**. With assistance provided by an outer intake valve guide **138** and an inner intake valve guide **174**, each defined in the proximal end of the reservoir **110** and configured to help to guide and position the cartridge **136**, the inner and the outer intake valve guides **138, 174** help to removably couple and to securely connect the cartridge **136** to the reservoir **110** to thereby insure a proper connection between the cartridge **136** and the reservoir **110**.

With further reference to **FIG. 4**, a cap **130**, configured to couple with the proximal end of the handle **102**, defines a set of threads along its interior surface that couple and mate with a corresponding set of threads defined in the handle **102** adjacent to its proximal end. When the cap **130** couples with the proximal end of the handle **102** and is rotated in

one direction, such rotating motion causes the sets of threads to mate, thereby connecting the cap **130** to the handle **102**.

The rotating motion of the cap **130** effectively tightens the cap **130** to the handle **102**, while simultaneously forcing the cartridge **136** forward toward the proximal end of the reservoir **110**, as shown by arrow **300** in **FIG. 6**. A spring **162** disposed in an inner surface of the cap **130** is configured to bias against the cartridge **136** and to help the cartridge **136** advance forward when the cap **130** is coupled to the handle **102** and is rotated to secure the cap **130** thereon. The spring **162** is further disposed and configured to be removed from the cap **130** and replaced with a spring having a different size such that the cap **130** and the spring **162** combination accommodate different sizes of cartridges **136**.

Once inserted into the chamber **102A** of the handle **102**, the rotating motion of the cap **130** forces the cartridge **136** forward toward and into the outer and the inner intake valve guides **138, 174** whereby it couples with the guides **138, 174** and the proximal end of the reservoir **110**. The cartridge **136** initially engages the outer guide and then the inner guide **174**, which is defined by a perimeter of the outer guide **138**. As shown in **FIG. 6**, in one embodiment, the inner and the outer intake valve guides **138, 174** define substantially circular guides wherein the inner guide **174** is disposed within the outer guide **138**, and each guide **138, 174** accommodates a distal portion of the cartridge **136**. The rotating motion of the cap **130** and the guidance of the outer and the inner guides **138, 174** help to position the distal end of the cartridge **136** substantially over a flexible membrane **172** disposed within the inner guide **174**.

The distal end of the cartridge **136** is further configured as a tapered end **137**. In one embodiment, a dam-like membrane (not shown) is disposed within the distal end of the

cartridge **136** or within the tapered end **137** such that, when the cartridge **136** is coupled to the proximal end of the reservoir **110**, as described below, the membrane is broken to place an interior of the cartridge **136** in fluid communication with the reservoir **110** interior. The membrane can be constructed of any material suitable for piercing including, but not limited to, metal.

When coupled to the proximal end of the reservoir **110**, the cartridge **136** is disposed over the membrane **172**. Once the cartridge **136** is positioned over the membrane **172**, additional rotation of the cap **130** causes the tapered end **137** to move forward to contact a piercing element **170**, e.g., an intake valve, disposed along, e.g., a center, of the membrane **172**. The piercing element or intake valve **170** is disposed and configured to receive the tapered end **137**. When the valve **170** receives the tapered end **137** as a result of the forward movement, the valve **170** pierces the dam-like membrane of the cartridge **136**. The intake valve **170** and the tapered end **137** are thereby connected. The valve **170** and the tapered end **137** effectively place the interior of the cartridge **136** in fluid communication with the interior of the reservoir **110**. Pressurized gas contained within the cartridge **136** can discharge from the cartridge **136** into the reservoir **110** interior to thereby pressurize the interior and the fluid contents contained therein. As long as the cartridge **136** contains a pressurized (compressed) gas, and remains connected to the reservoir **110** and in fluid communication with its interior, the reservoir **110** interior and its fluid contents remain pressurized. Actuating the switch **134**, as noted above, effectively actuates the actuator valve **122**, which causes a release of pressure from the pressurized reservoir **110** interior and a consequence discharge of a volume of fluid therefrom.

With further reference to **FIGS. 1-2**, the barrel **104** and the handle **102** may be constructed of a material suitable for permitting the device **100** to be easily manipulated manually and for withstanding moist and wet conditions. A suitable material is lightweight and does not add significant weight to the device **100**, thereby permitting the device **100** to be portable and easily transported. A suitable material provides sufficient strength such that the material can withstand wear and tear of such operations as engaging and disengaging the barrel **104** and the handle **102**. In particular, portions of the barrel **104** and the handle **102** defining the chambers **104B** and **102A**, as well as the cap **130**, that are configured to position the reservoir **110** and the cartridge **136** within the device **100** are constructed of such a material suitable for withstanding moist and wet conditions and wear and tear associated with assembly and disassembly of the device **100**. In addition, one or more components of the fluid misting assembly **101** can be constructed of a material suitable for providing those physical properties and characteristics described above. The outer and the inner intake valve guides **138, 174** are constructed of a material suitable for withstanding the engagement and disengagement of the cartridge **136** to the reservoir **110**. Also, the nozzle **116**, the dip tube **118** and the collar **120** can be similarly constructed of such a material suitable for providing such properties noted. A suitable material includes, but is not limited to, rubber, plastic, metal, wood or a combination thereof.

Referring to **FIGS. 7-8**, another embodiment of the invention provides a portable, cordless pressurized fluid dispensing device **200** configured as a hairbrush and including those elements and components described above with reference to the device **100** and **FIGS. 1-6**. As shown in **FIG. 7**, the device **200** includes the barrel **104** configured in a paddle-like conformation. In this embodiment, the paddle-like barrel **104** has a first outer

surface **204** and a second outer surface **205** (not shown). The first outer surface **204** defines a dispensing opening **224** in fluid communication with the chamber **104B** of the barrel **104** and further provides the plurality of bristles **106** projecting therefrom.

The proximal end **113** of the paddle-like barrel **104** is similarly constructed to that of the device **100** shown in **FIGS. 1-2**, and includes an opening **114** and one or more notches **206** defined along a portion of an inner surface of the barrel chamber **104B**. The one or more notches **206** are disposed and configured to couple with one or more corresponding notches **208** defined along a surface of the distal end **115** of the handle **104**. The notches **206** of the barrel **104** and the notches **208** of the handle **102** are disposed and configured such that each notch **206, 208** inserts into an area defined by adjacent pairs of notches **206, 208**. In other words, adjacent pairs of notches **206, 208** define an area sized and configured to receive one of the opposing corresponding notches **206, 208**.

Where the fluid misting assembly **101** is substantially assembled and the barrel **104** and the handle **102** are engaged, the nozzle **116** is disposed within the chamber **104B** of the barrel **104** such that it is substantially adjacent to and aligned with the dispensing opening **224** in the outer surface **104A** of the barrel **104**. In one embodiment, the dispensing opening **224** is sized and configured to receive the nozzle **116**. The nozzle **116** is correspondingly configured and disposed in the chamber **104B** such that the dispensing opening **224** receives the nozzle **116** when the nozzle **116** is connected to the reservoir **110**, e.g., via the dip tube **118**. In this configuration the nozzle **116** dispenses a fluid spray or mist through the dispensing opening **224**.

Other embodiments are within the scope and spirit of the invention. For example, the device **100, 200**, with or without the plurality of bristles **112**, can be configured as a

kitchen utensil, such as a cooking oil/melted butter dispensing pastry brush or a cooking oil/melted butter-basting device. The device **100, 200** can be further configured, for example, as a hardware device, such as a paint-dispensing device. In these cases, the reservoir **110** size can be adjusted to accommodate, if necessary, a larger volume of fluid for dispensing, as well as the size of the cartridge **136** to provide sufficient compressed gas to pressurize and discharge a larger volume of fluid. In addition, the openings **112, 224**, the nozzle **116** and the dip tube **118** can be sized and configured appropriately to accommodate such viscous fluids as cooking oil, melted butter and paint, and to allow such fluids to pass through these components and to be delivered as a fluid spray or mist from the device **100, 200**.

Other embodiments can include, for example, the device **100, 200** configured for incorporation with or configured as a children's water-squirting toy, a personal device, e.g., a portable water misting/cooling fan, or as another personal grooming device, e.g., a fragrance dispenser, to dispense a cosmetic fluid as a mist.

Having thus described at least one illustrative embodiment of the invention, various alterations, modifications and improvements will readily occur to those skilled in the art. Such alterations, modifications and improvements are intended to be within the scope and spirit of the invention. Accordingly, the foregoing description is by way of example only and is not intended as limiting. The invention's limit is defined only in the following claims and the equivalents thereto.

What is claimed is: